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Landbird Monitoring in the National Park Service's San Francisco Bay Area Network

A Report of the 2004 Field Season for:

Golden Gate National Recreation Area
John Muir National Historic Site
Pinnacles National Monument
and
Point Reyes National Seashore

By Diana Humple and Thomas Gardali
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PRBO Conservation Science
4990 Shoreline Highway
Stinson Beach, CA 94970
415-868-1221
www.prbo.org

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Introduction

PRBO Conservation Science has been conducting landbird monitoring since 1965, when the organization was founded and work began in the Point Reyes National Seashore (see Ballard et al. 2003, Howell and Gardali 2003). In addition, PRBO has been conducting annual, standardized point count surveys, nest searching, and constant effort mist-netting at other locations within the Point Reyes National Seashore (PORE) and the Golden Gate National Recreation Area (GOGA) for nearly a decade (Holmes et al. 1998, Scoggin et al. 2000, Gardali et al. 2003a, Gardali et al. 2003b, Michaud et al. 2004, Samuels et al. *in press*). Over the last five years, however, PRBO conducted more comprehensive habitat-specific landbird inventories within PORE, GOGA, Pinnacles National Monument (PINN), and John Muir National Historic Site (JOMU) (Flannery et al. 2001, Hammond and Geupel 2003, Haff et al. 2003), primarily focusing on the breeding season.

In 2004, PRBO continued monitoring at many of these long-term sites, some of them year-round, and initiated a pilot monitoring program at others (e.g., PINN, JOMU). As of this year, most of these sites are being instituted as long-term monitoring sites and will be surveyed annually. Additional sites will be added once the landbird monitoring plan is finalized. Fieldwork was conducted during the breeding season, except in GOGA where some monitoring were also done in fall and PORE where monitoring occurs at some sites year-round. Some of this monitoring, especially at the Palomarin Field Station, is funded by sources other than the NPS, including members, private donors, and foundations. We did not do any formal analysis of our data within the context of this report.

The goals of this report are to present:

1. Site selection methodology for the Landbird Monitoring Program of the San Francisco Bay Area National Park Network (SFBAN).
2. Summaries of all sites where monitoring occurred, including habitat type, methods, location, and monitoring history.
3. Basic results from the 2004 field season, including species detected (by season, park and method), and number of nests found.
4. Web-based access to all 2004 point count data now available online to SFBAN members (e.g., raw data, querying tools).

Methods

Site Selection

See Table 1 and CD Supplement A for complete details of all sites surveyed in 2004.

Golden Gate National Recreation Area

We continued intensive monitoring at two riparian sites, Redwood Creek and Lagunitas Creek, which have become among our longest run sites in the region, where we employ multiple monitoring methods (see Table 1 for details). PRBO began monitoring at these sites in 1997 as

part of a separate monitoring project within GOGA. Point count survey stations and nest monitoring were established here by the Kern River Research's Center's Brown-headed Cowbird Project (Halterman et al. 1999) in 1995. PRBO began point count surveys and nest monitoring at these creeks in 1997 and mist-netting was initiated in 2001. We opted to continue monitoring these sites intensively in order to contribute to a more thorough understanding of the landbird communities at these sites through the gathering of long-term data. The methods and amount of monitoring (e.g., season) may change once the SFBAN landbird monitoring plan is finalized. However, we expect that, at the very least, the point count surveys will continue.

John Muir National Historic Site

The John Muir point count transect at Mt. Wanda, which traversed all habitat types present at JOMU, was originally surveyed in 2001 as part of an inventory of JOMU and Eugene O'Neill National Historic Sites (Hammond and Geupel 2003), and were repeated in 2004 as part of the SFBAN landbird monitoring program. This site will likely be surveyed by volunteers in future years.

Pinnacles National Monument

In 2004, we initiated a long-term landbird monitoring program at Pinnacles. Riparian and chaparral habitats are priority habitats for PINN and SFBAN. These habitats host the most birds and cover the greatest area, respectively, within the park. With our limited resources, we also attempted to include a decent sample size of point counts located within the Park's pine/oak woodland habitat. PRBO and PINN collaborated in examining the point count stations that were conducted previously to determine which sites to include in the long-term monitoring efforts; these included ones surveyed by PRBO in 2001-2002 during an avian inventory of the park (Haff et al. 2003), as well as those points surveyed in 1983-1985 and again in 1997-1999 by NPS biologists. Ultimately PRBO and PINN chose survey stations that: 1) best represented the different habitat and sub-habitat types in the park (e.g., we wanted our chaparral points to encompass different types of chaparral habitat); 2) could be clumped with other individual point count stations in order to create a transect that could be surveyed in one morning (i.e., we discarded some of the historical points that were located in isolation); 3) had reasonable access, even if by backpacking; and 4) could be surveyed with the resources available for landbird monitoring in this park (i.e., only a limited number could be selected).

Point Reyes National Seashore

We have been conducting long-term monitoring within PORE at the Palomarin Field Station, since 1965 when PRBO was founded and mist-netting efforts began. Standardized constant effort mist-netting has been done there since 1976; nest monitoring since 1979; point counting there and at the adjacent Arroyo Honda since 1992; running a second mist-netting station at the site since 1992; conducting fall area search surveys since 2003; and doing Winter Bird Population Studies (WBPS) since 1980 at 3 plots and since 1997 on Palomarin Grid 5. It is a top priority of PRBO to continue monitoring at this site, as it is one of the longest continuously run landbird monitoring stations in North America, and is the longest run banding stations in the United States.

PRBO began long-term monitoring at Muddy Hollow as part of a larger study examining the effects of the Mt. Vision Fire on landbirds (Gardali et al. 2003a, Samuels et al. in press). The

point counts stations we surveyed there and at Lower Olema Creek were also a continuation of a project initiated by the Kern River Research Center in 1995. The Estero transect was established in 2002 as part of the Wildland Urban Interface (WUI) project.

Other Sites

We conduct year-round constant effort mist-netting; point counts; and area search surveys at Pine Gulch on the Bolinas Lagoon, located on Marin Open Space land. This site has been surveyed since 1994 and is included herein as a replicate site for work conducted in the SFBAN.

Table 1. Summary of all sites surveyed in the San Francisco Bay Area Network**, N**ational Parks Service Monitoring Program, PRBO 2004.

Park	Transect	Code	Old Code	Primary Habitat	Current Methods Used[a] (and # of sites)					# of Previous Years of Surveys				
					PC	NS	MN	WS	AS	PC	NS	MN	WS	AS
GOGA	Lagunitas Creek	LACR	LC	Riparian	18	-	10	-	3	7	3[b]	3	-	3
	Redwood Creek	RECR	RC, REDC	Riparian	24	2	11	-	3	7	7	3	-	3
JOMU	John Muir	JOMU	MTWA	Mixed habitats	14	-	-	-	-	1	-	-	-	-
						-	-	-	-		-	-	-	-
PINN	Balconies	BALC		Chaparral	10	-	-	-	-	≥1[c]	-	-	-	-
	Headquarters	HEAD		Chaparral, Riparian, Pine/oak	7	-	-	-	-	≥1[c]	-	-	-	-
	High Peak	HIGH		Chaparral, Pine/oak woodland	10	-	-	-	-	≥1[c]	-	-	-	-
	McCabe Canyon	MCCA		Pine/oak woodland	10	-	-	-	-	1[d]	-	-	-	-
	North Chalone Peak	NCPE		Chaparral	8	-	-	-	-	1[d]	-	-	-	-
	North Fork Chalone Creek	NFCC[e]	WFCC	Riparian	12	-	-	-	-	1[d]	-	-	-	-
	North Wilderness Trail	NWTR		Chaparral	14	-	-	-	-	1[e]	-	-	-	-
	South Chalone Peak	SCPE		Chaparral	10	-	-	-	-	1[d]	-	-	-	-
	South Wilderness Trail	SWTR		Riparian	11	-	-	-	-	1[e]	-	-	-	-
PORE	Arroyo Honda	ARHO	AH	Mixed evergreen/Riparian	6	-	-	-	-	11	-	-	-	-
	Estero	ESTE		Coastal scrub	9	-	-	-	-	1[g]	-	-	-	-
	Lower Olema Creek	LOOL	LO, LOCR	Riparian	11	-	-	-	-	3[h]	-	-	-	-
	Muddy Hollow	MUHO	MH	Riparian	15[g]	-	10	-	6	7	2[i]	9	-	9
	Palomarin	PALO	PN	Coastal scrub/Mixed evergreen	13	3	20	3	1	12	25	39	14	1
	Palomarin Grid 5	PAG5	G5	Coastal scrub	7	1	-	2[j]	-	7	10	-	7	-
	Palomarin Uppers	PGUP	PG	Coastal scrub	n/a	n/a	10	-	-	-	-	12	-	-
Other	Pine Gulch	PIGU	PI	Riparian	5	-	10	-	3	7	-	10	-	10

[a] PC=point counts, NS=nest searching, MN=mist-netting, WS=winter bird population studies; AS=area search; [b] nest searching conducted 1997-1999; [c] surveyed by NPS in 1983-1995 and again in 1997-1999; [d] surveyed by PRBO in 2001; [e] surveyed by PRBO in 2002; [e] misnamed West Fork Chalone Creek (WFCC) during inventory, including in final inventory report; [g] Surveyed in 2002; [h] surveyed in 1997, 1998, and 2003, with the four points at Five Brooks dropped after '98; [i] formerly 17 points but two dropped because of access difficulties following vegetation succession, nest searching conducted 1996-1997; [j] the formerly 40 ha WBPS plot for Grid 5 was reduced in 2004 to two plots 8 ha apiece.

Point count surveys

Repeatable point count surveys were conducted following standardized point count protocol as described in Ralph et al. (1993 and 1995). Transects consist of multiple point count survey stations, spaced at least 200 m apart from one another (at least 250m in PINN). At each station, a five-minute, variable circular plot (VCP) survey was conducted, with separate categories for different distance band widths. This varied slightly between parks in order to retain consistency to previous years; at PINN band widths were 0-10m, 10-20m, 20-30m, 30-40m, 40-50m, 50-75m, 75-100m, and >100m. At PORE, GOGA, and JOMU band widths were 0-10m, 10-20m, 20-30m, 30-50m, 50-100m, and >100m. All birds detected within a five-minute period at each station were recorded and placed within the distance band width where they were initially detected, as well as those flying over the census area but not landing. The type of initial detection (song, visual or call) was noted for each individual. Counts began around local sunrise (or 15 minutes after) and continued for no more than four hours in order to restrict the census to peak singing hours. Counts were not conducted during poor weather conditions, when bird activity levels and detection probabilities were reduced.

All point count stations were visited three times (with a few exceptions; Lower Olema Creek was visited twice), with a minimum of 10 days between visits, to increase detection probabilities of less common species. These visits were between late April and July for GOGA, JOMU and PORE, and between late April and early June for PINN as activity levels there drop earlier (Appendix A).

Statistical Analysis

Point count analysis was restricted to a subset of the species encountered. We excluded species that do not breed in the study area as well as those species that are not adequately sampled using the point count method (e.g., waterbirds, raptors, and pigeons, owls). All analyses were for detections within 50 meters, and were averaged across all points for each transect. Presenting the mean population indices this way allows for comparisons between transects or habitats consisting of different numbers of point count stations. Species richness is the average number of species detected per point within a transect. Species diversity is defined as the number of species detected weighted by the number of individuals of each species. A high diversity score indicates high ecological (species) diversity, or a more equal representation of the species. The index of abundance is the mean number of individuals detected per station per visit. This number is obtained by dividing the total number of detections within 50 meters by the number of stations and the number of visits.

Online Point Count Data

We uploaded all SFBAN point count data to 2004 to a PRBO-managed website, available through PRBO's website or that of California Partners in Flight (CalPIF). This data is available to all SFBAN members to browse, download, or query (see *Results* below).

Mist-netting

Constant-effort mist netting provides data on the productivity of locally breeding species, adult annual survival (if conducted for multiple years), site fidelity, age classes of migrant and winter species, habitat use, and stopover ecology. Mist netting was conducted year-round in PORE at PRBO's Palomarin Field Station (two sites) and at Muddy Hollow; year-round at Pine Gulch on

the Bolinas Lagoon, on Marin County Open Space, included in this report as it is used as a replicate site for park sites; and in spring through fall in GOGA at Redwood and Lagunitas creeks (see Table 1 for more details). An array of nets was opened 15 minutes after local sunrise and operated for 6 hours. At the main Palomarin site, nets were run 6 days per week May through November and 3 days per week December through April. At all other sites, nets were run approximately once every 10 days May through mid-August, once every 7 days mid-August through October, and, if winter mist-netting was done, once every 10 days November through April. There were 20 nets at Palomarin, 11 at Redwood Creek, and 10 at each of the other sites.

Each bird captured (except hummingbirds outside of Palomarin) was banded using a United States Geological Survey / Biological Resources Division (USGS/BRD) federal band enabling permanent identification. Study species at Palomarin were also fitted with color bands to make individual identification possible in the field. Prior to its release of either newly banded or recaptured individuals, biologists recorded species, age, sex, skull ossification, breeding condition, fat score, molt, flight feather wear and fade, wing length, weight, time captured and net captured in, as described by Pyle (1997). All mist netting data will be submitted to the MAPS program of the Institute for Bird Populations (DeSante et al. 1998) and the USGS Bird Banding Lab (BBL, Patuxent, MD).

Nest Searching

Nest monitoring measures nesting success in specific habitats and provides information on population health. Measurements of vegetation associated with nests may identify habitat features that influence breeding productivity as well as species-specific requirements. Examination of nests also allows collection of life history data (e.g., clutch size, number of broods, number of nesting attempts) that provide important insight into "vulnerability of species to decimation or perturbations" (Martin and Geupel 1993).

Biologists monitored nests on four plots (one that is called Grid 5 in Table 1) at Palomarin (PORE) in coastal scrub habitat, and on two nest plots at Redwood Creek (GOGA) in riparian habitat. Nest finding and monitoring followed the specific guidelines outlined in Martin and Geupel (1993). Nests were located at all stages (construction, egg-laying, incubation, and nestling). Checking nests (generally every 1-4 days) was done with careful attention given to minimizing human disturbance. These precautionary measures included keeping visits brief, minimizing disturbance to the area around a nest and staying clear of nest sites when predators were detected nearby. In additions, photographs of nestlings of certain species were taken to contribute to a nestling guide being produced by PRBO and USFWS.

Area Search Surveys

During the fall we conducted area search censuses at five of our six our mist-netting plots around or near the nets in order to document all species using the area, including ones not typically captured in mist-nets or not captured proportionately to their densities. Plots were restricted to the same habitat the nets were in. Three plots were surveyed at each of the riparian stations, and one plot at Palomarin. Each plot was surveyed, if possible, each time mist-netting was conducted. This was done during the first few hours after sunrise. On some mornings when capture rates in the nets were high, biologists were unable to conduct area searches; occasionally they were done the following day. During an area search survey the observer covered the entire

plot in 20 minutes (30 for Palomarin), recording all birds by species detected using the habitat within the plot (see Ralph et al. 1993 for more details of this method).

Winter Bird Population Studies

We conduct weekly Winter Bird Population Studies on each of our Palomarin nest plots in January and February. Protocols followed standardized techniques provided from the Cornell Laboratory of Ornithology's Resident Bird Counts project (Lowe 1994). Each observer visited his or her plot weekly over approximately a two-month period, and spent the morning thoroughly and systematically covering their plot, mapping all individuals detected by species. Counts were not conducted during inclement weather. This was the 15th year of study for 3 of our plots and the 8th year for a 4th plot.

Vegetation Assessment

In 2004, vegetation data was collected on nest plots and at nests once they were no longer active to relate differences in nest success or bird species nest site choice to differences in vegetation. Vegetation was assessed using a modified version of a standardized BBIRD protocol (Martin 1997) for collecting vegetation at nests, and basic characteristics of the site were recorded (aspect, slope, cover of individual plant species).

UTM coordinates

We have UTM coordinates for each point count census station. Because we did not initiate any entirely new point count transects, all of these transects had been geo-referenced in the past, but some had to be updated because the coordinates had been collected before the accuracy of civilian GPS units had been improved. See Supplement A for databases of UTMs for each point count station as well as narratives. In addition, the UTMs for the location of all nests monitored in 2004 were also recorded, and are kept in master files at PRBO.

Personnel

Point count data in GOGA and PORE were collected primarily by PRBO biologists Tom Gardali and Diana Humple, with additional help by Parvaneh Abbaspour, Dennis Jongsomjit, Diana Stralberg, and Viola Toniolo. Tom Gardali conducted all surveys within the Presidio. Jim Petterson (PINN), Gaven Emmons (PINN), Diana Humple, and Tanya Haff (PRBO) conducted all surveys within Pinnacles National Monument. The John Muir National Monument point count data was collected by Cheryl Abel (JOMU) and Tom Gardali. Nest monitoring within GOGA was collected by Amon Armstrong, and within PORE by Errin Kramer-Wilt, Tristan Gingerich, Gerhard Epke, Laura Kaplan, and Dennis Jongsomjit. Mist-netting and area search surveys within the two parks were done under the guidance of Diana Humple; the winter interns responsible for this as well as winter bird population studies were Michael Rogner, Todd Thompson, Parvaneh Abbaspour, Elvis Cuevas, Amon Armstrong, and Amanda Shults; spring and summer interns were Angie Chessey, Lishka Arata, Leslie Slavin, and Rosie Sigloch; and fall interns were Kristy Dybala, Letty Andino, Jora Rehm-Lorber, and Laurel Podsen. Computer programs used to manage and summarize data, as well as the online point count data query tools, were created by PRBO staff Grant Ballard. Diana Stralberg and Viola Toniolo, as well as Jim Petterson at Pinnacles, provided GIS support. These projects were carried out under the guidance of Tom Gardali and PRBO's Terrestrial Program Director Geoffrey Geupel.

Results

Through all these methods combined (and excluding incidental observations), a total of 90 species were detected in GOGA, 46 species in JOMU, 76 in PINN, and 111 in PORE. These are broken down by method below.

Point Counts

Population indices for each transect are presented in Table 2. A complete list of all species detected with point count surveys for each site is presented in Appendix A. Appendix B has dates for all years that PRBO has done these surveys; this will be a useful reference when determining appropriate dates to visit these sites in the future.

Table 2. Species diversity, species richness, and abundance**,** averaged across all points and, for abundance, all visits, SFBAN 2004.

Station Name	Station Code	Species Diversity	Species Richness	Index of Abundance
Arroyo Honda	ARHO	6.74	8.17	5.92
Balconies	BALC	10.48	12.70	7.84
Estero	ESTE	3.26	4.00	3.19
Headquarters	HEAD	10.38	12.29	7.59
High Peak	HIGH	6.90	7.80	4.97
John Muir	JOMU	10.33	13.14	11.38
Lagunitas Creek	LACR	8.98	10.28	6.25
Lower Olema Creek	LOOL	6.58	7.64	7.41
McCabe Canyon	MCCA	7.73	10.00	8.10
Muddy Hollow	MUHO	8.53	10.33	6.75
North Chalone Peak	NCPE	7.29	8.63	5.38
North Fork Chalone Creek	NFCC	11.04	12.67	7.16
North Wilderness Trail	NWTR	6.30	7.07	3.86
Palomarin Grid 5	PAG5	6.19	7.43	5.74
Palomarin	PALO	6.89	8.15	5.49
Pine Gulch	PIGU	9.35	11.80	12.68
Redwood Creek	RECR	9.14	11.50	8.70
South Chalone Peak	SCPE	5.00	6.30	4.50
South Wilderness Trail	SWTR	10.83	12.45	7.42

Online Point Count Data

This year's electronic point count data for the SFBAN sites can be viewed and queried online by following these steps:

- Go to: http://cain.nbii.gov/prbo/onpc/.
- Insert the UserID *SFBAN* (note that this is CAPS sensitive)
- Insert the password *prbobirds* (note that this is CAPS sensitive).

See Appendix C for a representation of what these webpages look like, providing an indication of how the data can be queried by interested participants of SFBAN. The following options exist for looking at the data:

1. Select *Browse/edit point count data* off the index in order to examine all the data for each visit at each point count station
2. Select *Download complete data sets* to have all the 2004 SFBAN point count data
3. Select *Query point count data* to do query the data set in numerous ways:
   - Select the stations you want to include in the query
   - Select the distance band and data type you want to query (e.g., all data; visual flyovers; all data <50m); you can choose multiple types simultaneously
   - Choose the month and/or year ranges you want to include
   - Select your level of query (by station or by site)
   - Select any species you'd like to be excluded in the query
   - Submit your query and view results
   - Download results if desired.

Mist-netting

We present the total number of captures, by season and banding location, captured in winter 2003-2004, breeding season of 2004, and fall of 2004, in Appendix D. All captures of each individual are included. We also present the number of net hours by season and site so that the capture rate per 100 or 1000 net hours can be extrapolated in order to compare sites or years in a standardized fashion.

Nest Monitoring

We present the total number of nests, by species, collected within the parks in Table 3. Nests for 15 species were found in coastal scrub habitat at Palomarin, and for 30 species in riparian habitat at Redwood Creek.

Table 3. Total numbers of nests at our PORE and GOGA nest searching plots, PRBO 2004.

	PORE		GOGA
Species	Palomarin Grids 1, 2 and 4	Palomarin Grid 5	Redwood Creek
Mourning Dove	-	-	1
Red-shafted Flicker	-	-	3
Downy Woodpecker	-	-	3
Hairy Woodpecker	-	-	1
Allen's Hummingbird	2	-	11
Anna's Hummingbird	1	-	4
Western Wood-Pewee	-	-	1
Black Phoebe	-	-	2
Pacific-slope Flycatcher	-	-	2
American Robin	-	-	9
Swainson's Thrush**	-	-	17
Western Bluebird	-	-	2
European Starling	-	-	3
Warbling Vireo	-	-	3
Steller's Jay	-	-	1
Western Scrub Jay*	1	-	1
Tree Swallow	-	-	4
Violet-green Swallow	-	-	6
Wrentit*	50	10	-
Bushtit	3	1	3
Chestnut-backed Chickadee/	-	-	17
Pygmy Nuthatch	-	-	2
Brown Creeper	-	-	3
Bewick's Wren*	3	1	-
Winter Wren	-	-	1
Orange-crowned Warbler	3	-	2
Wilson's Warbler	2	-	16
California Towhee*	2	-	-
Spotted Towhee*	12	1	-
Song Sparrow*	36	32	27
White-crowned Sparrow*	3	2	-
Oregon Junco	2	-	-
Black-headed Grosbeak	-	-	8
Red-winged Blackbird	-	-	2
House Finch	1	-	2
American Goldfinch	17	1	8
Total	**138**	**48**	**165**

*Color-banded species (Palomarin); **Color-banded species (RECR); no longer being color banded in '04.

Area Search Surveys
Eighty-two species were detected during fall area search surveys in GOGA, PORE, and at PIGU. See Appendix E for the complete list of species detected by site in 2004.

Winter Bird Population Studies
See Appendix F for summaries of all five 2004 WBPS plots.

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Appendix A. Species detected at each SFBAN site with point count surveys in 2004**;** this includes birds detected at all distances from the point, including flyovers.

Species	ARHO	BALC	ESTE	HEAD	HIGH	JOMU	LACR	LOOL	MCCA	MUHO	NCPE	NFCC	NWTR	PAG5	PALO	PIGU	RECR	SCPE	SWTR
California Quail	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Caspian Tern																●	●		
Common Merganser							●												
Gadwall										●									
Great Blue Heron			●																
Great Egret			●					●						●			●		
Killdeer																●			●
American Coot																●			
Mallard			●				●	●						●			●		●
Rock Dove						●													
White-tailed Kite						●		●									●		●
Band-tailed Pigeon	●						●			●				●			●		
Mourning Dove		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Turkey Vulture		●		●	●	●	●	●	●	●			●	●	●		●		
Sharp-shinned Hawk				●					●										
Cooper's Hawk				●									●						●
Red-tailed Hawk			●	●	●	●	●	●	●	●		●	●	●	●		●	●	
Red-shouldered Hawk						●											●		●
Golden Eagle		●																	
Prairie Falcon											●		●					●	
American Kestrel									●		●		●					●	●
Osprey	●		●							●				●	●				
Long-eared Owl									●										
Northern Saw-whet Owl		●																	●
Belted Kingfisher							●												
Hairy Woodpecker	●		●		●		●	●		●		●	●				●		
Downy Woodpecker					●					●		●		●		●	●		●
Nuttall's Woodpecker		●		●	●	●	●		●	●	●	●	●				●	●	●
Pileated Woodpecker							●												
Acorn Woodpecker		●		●	●	●	●	●	●			●						●	●
Red-shafted Flicker	●	●		●	●	●		●	●	●	●	●	●	●	●		●	●	●
White-throated Swift		●		●	●								●					●	●
Black-chinned Hummingbird																			●
Anna's Hummingbird		●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●
Allen's Hummingbird	●		●				●	●		●				●	●	●	●		

Species	ARHO	BALC	ESTE	HEAD	HIGH	JOMU	LACR	LOOL	MCCA	MUHO	NCPE	NFCC	NWTR	PAG5	PALO	PIGU	RECR	SCPE	SWTR
Western Kingbird																			●
Ash-throated Flycatcher		●		●	●	●	●	●	●	●	●	●	●				●	●	●
Say's Phoebe				●															
Black Phoebe		●	●	●	●	●	●	●		●		●	●				●		●
Olive-sided Flycatcher	●		●				●	●		●				●	●	●	●	●	
Western Wood-pewee		●	●	●	●	●	●	●	●	●		●					●	●	●
Pacific-slope Flycatcher	●	●		●		●	●	●	●	●	●	●		●	●	●	●		●
Steller's Jay	●	●		●	●	●	●	●		●		●		●	●		●		●
Western Scrub Jay	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●
Common Raven	●	●	●	●	●		●	●	●	●	●	●	●	●			●	●	●
American Crow			●			●	●							●		●	●		●
European Starling			●		●	●	●	●	●	●			●	●			●		●
Brown-headed Cowbird		●	●	●	●		●	●	●	●		●	●	●	●	●	●		
Red-winged Blackbird						●	●	●								●	●		
Western Meadowlark						●													
Bullock's Oriole				●			●		●										
Brewer's Blackbird			●				●										●		
Purple Finch	●	●	●	●	●		●	●	●	●		●		●	●		●	●	●
House Finch		●	●	●	●	●	●	●			●				●		●		●
American Goldfinch			●				●	●		●				●	●	●	●		
Lesser Goldfinch		●		●	●	●	●					●	●			●		●	●
Pine Siskin								●						●					
Savannah Sparrow			●											●					
Grasshopper Sparrow			●											●					
Lark Sparrow													●						
Nutt. White-crowned Sparrow			●							●				●	●		●		
Chipping Sparrow					●		●				●								
Oregon Junco	●	●	●	●		●	●	●	●		●	●		●	●		●		●
Sage Sparrow					●				●			●	●					●	
Rufous-crowned Sparrow				●	●				●			●	●					●	●
Song Sparrow	●	●	●	●			●	●		●		●		●	●	●	●		●
Spotted Towhee	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●
California Towhee		●		●	●	●	●	●	●	●	●	●	●		●		●	●	●
Rose-breasted Grosbeak	●																		
Black-headed Grosbeak	●	●	●	●	●	●	●	●	●	●	●	●	●			●	●	●	●
Lazuli Bunting					●	●	●	●	●			●							●

Species	ARHO	BALC	ESTE	HEAD	HIGH	JOMU	LACR	LOOL	MCCA	MUHO	NCPE	NFCC	NWTR	PAG5	PALO	PIGU	RECR	SCPE	SWTR
Western Tanager						●					●	●							
Cliff Swallow			●			●	●	●		●			●		●	●	●		
Barn Swallow			●				●	●		●				●	●		●		
Tree Swallow			●				●	●		●	●	●		●			●		
Violet-green Swallow		●		●	●	●	●			●	●	●	●				●	●	●
Cedar Waxwing								●		●			●				●		
Phainopepla				●							●		●						●
Loggerhead Shrike		●							●										●
Warbling Vireo	●	●		●	●	●	●	●	●	●		●			●	●	●	●	●
Cassin's Vireo																			●
Hutton's Vireo	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●
Orange-crowned Warbler	●	●	●	●	●		●	●	●	●		●	●	●	●		●	●	●
Yellow Warbler	●						●		●		●						●		
Black-throated Gray Warbler												●							
Townsend's Warbler						●					●	●							
MacGillivray's Warbler	●																		
Common Yellowthroat			●					●		●						●	●		
Yellow-breasted Chat																			●
Wilson's Warbler	●		●	●	●	●	●	●	●	●	●	●		●	●	●	●		●
Northern Mockingbird						●							●						
California Thrasher		●			●				●		●	●	●					●	
Canyon Wren		●		●	●													●	
Bewick's Wren	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
House Wren		●		●	●	●			●			●	●						●
Winter Wren	●						●	●							●		●		
Marsh Wren										●							●		
Brown Creeper	●						●												
White-breasted Nuthatch		●		●	●	●			●		●	●							●
Red-breasted Nuthatch								●						●	●				
Pygmy Nuthatch																●	●		
Oak Titmouse		●		●	●	●	●		●		●	●	●					●	●
Chestnut-backed Chickadee	●					●	●	●		●				●	●	●	●		
Wrentit	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●
Bushtit		●	●		●	●	●		●	●	●	●	●	●	●		●	●	●
Golden-crowned Kinglet	●													●	●				
Blue-gray Gnatcatcher		●			●	●			●		●	●	●					●	

Species	ARHO	BALC	ESTE	HEAD	HIGH	JOMU	LACR	LOOL	MCCA	MUHO	NCPE	NFCC	NWTR	PAG5	PALO	PIGU	RECR	SCPE	SWTR
Swainson's Thrush	●		●			●	●	●		●	●	●		●	●	●	●		●
Hermit Thrush															●				
American Robin	●	●	●	●	●	●	●	●		●		●		●	●	●	●		●
Western Bluebird		●	●	●	●	●	●		●		●		●						●

Appendix B. Dates of point count visits across all years, San Francisco Bay Area National Parks Monitoring.

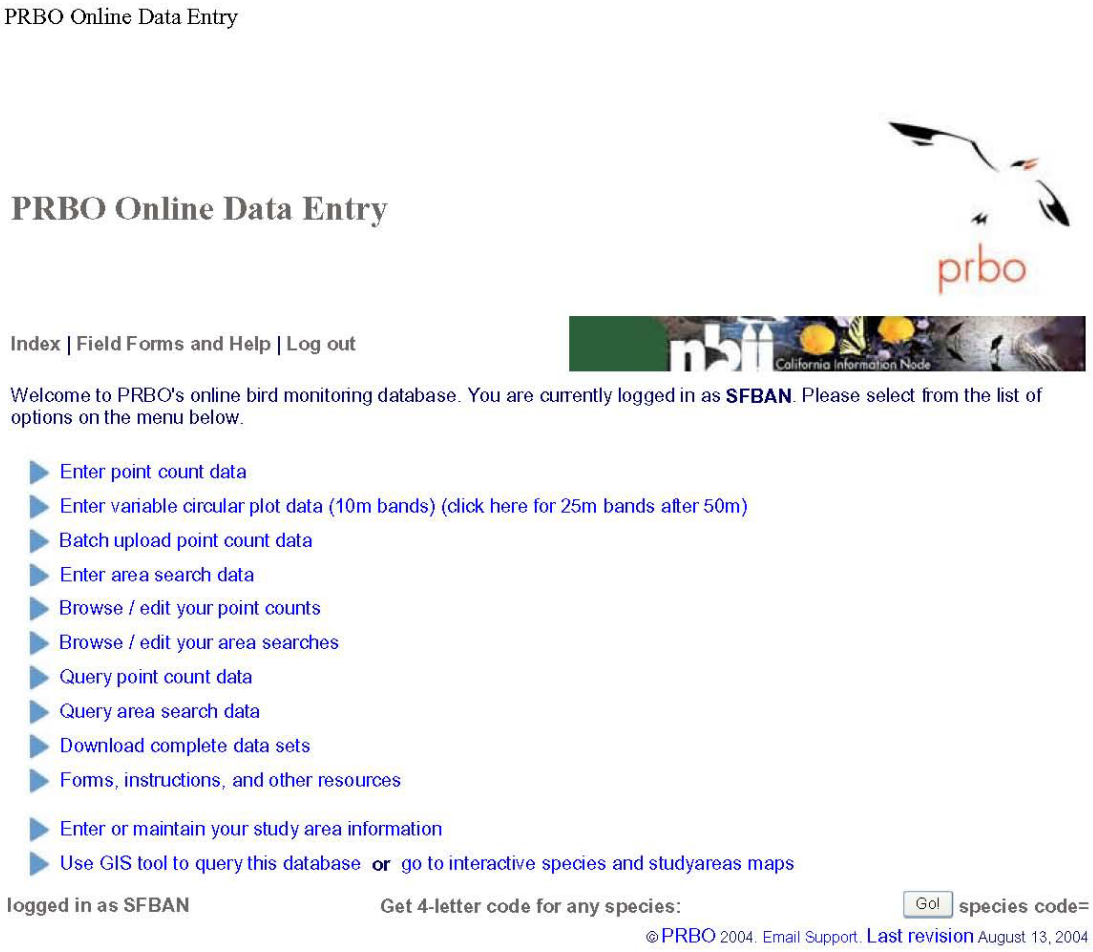
Park	Station	Visit #1	Visit #2	Visit #3
GOGA	Lagunitas Creek	5/4/2004	5/31/2004	7/7/2004
		5/16/2003	6/4/2003	6/19/2003
		5/8/2002	5/23/2002	6/11/2002
		5/23/2001	6/15/2001	6/30/2001
		5/13/2000	5/25/2000	6/12/2000
		5/10/1999	5/27/1999	6/16/1999
		4/28/1998	5/20/1998	6/18/1998
		4/25/1997	5/21/1997	6/18/1997
	Redwood Creek (Upper)	4/27/2004	5/19/2004	7/2/2004
		5/20/2003	5/30/2003	6/17/2003
		5/10/2002	5/24/2002	6/10/2002
		5/22/2001	6/12/2001	6/27/2001
		5/20/2000	6/2/2000	6/14/2000
		5/7/1999	5/26/1999	6/12/1999
		4/29/1998	5/23/1998	6/10/1998
		4/23/1997	5/26/1997	6/17/1997
	Redwood Creek (Lower)	5/1/2004	5/18/2004	6/25/2004
		5/15/2003	5/30/2003	6/17/2003
		5/9/2002	5/30/2002	6/13/2002
		5/21/2001	6/11/2001	6/26/2001
		5/23/2000	6/5/2000	6/17/2000
		5/7/1999	5/26/1999	6/12/1999
		4/29/1998	5/23/1998	6/10/1998
		4/23/1997	5/26/1997	6/17/1997
JOMU	John Muir	5/14/2004	6/4/2004	6/16/2004
		5/14/2004	5/28/2004	6/11/2004
PINN	Balconies [a]	5/8/2004	5/19/2004	6/5/2004
	Headquarters [a]	5/7/2004	5/18/2004	6/6/2004
	High Peak [a]	5/9/2004	5/20/2004	6/7/2004
	McCabe Canyon	5/10/2004	5/22/2004	6/1/2004
		5/7/2001	5/30/2001	6/21/2001
	North Chalone Peak	5/11/2004	5/21/2004	6/3/2004
		5/7/2001	5/30/2001	6/17/2001
	North Fork Chalone Creek	5/4/2004	5/14/2004	5/30/2004
		5/8/2001	5/31/2001	6/20/2001
	North Wilderness Trail	5/4 and 5/6/2004	5/17/2004	6/4/2004
		6/9/2002	6/30/2002	n/a
	South Chalone Peak	5/5/2004	5/16/2004	6/5/2004
		5/8/2001	5/30/2001	6/17/2001
	South Wilderness Trail	5/5/2004	5/17/2004	6/6/2004
		6/8/2002	6/23/2002	n/a

Park	Station	Visit #1	Visit #2	Visit #3
PORE	Arroyo Honda	5/2/2004	5/27/2004	6/25/2004
		4/30/2003	5/31/2003	6/15/2003
		5/8/2002	5/31/2002	6/14/2002
		5/21/2001	6/11/2001	n/a
		5/9/2000	5/23/2000	7/9/2000
		4/28/1999	6/7/1999	6/30/1999
		5/13/1998	6/9/1998	7/2/1998
		5/6/1997	5/31/1997	6/26/1997
		5/4/1996	5/31/1996	6/11/1996
		5/19/1995 [b]	6/21/1995 [b]	6/30/1995 [b]
		5/26/1994 [b]	6/2/1994 [b]	6/26/1994 [b]
		5/23/1993 [b]	6/18/1993 [b]	7/14/1993 [b]
	Estero	5/5/2004	5/29/2004	6/26/2004
		5/12/2002	5/30/2002	n/a
	Lower Olema Creek	5/7/2004	6/1/2004	n/a
		5/21/2003	6/14/2003	n/a
		4/28/1998	6/5/1998	6/26/1998
		5/3/1997	6/1/1997	6/27/1997
	Muddy Hollow	5/9/2004	6/1/2004	6/28/2004
		5/13/2003	5/31/2003	6/23/2003
		5/11/2002	5/29/2002	6/9/2002
		5/27/2001	6/14/2001	6/28/2001
		5/16/2000	6/6/2000	6/19/2000
		5/17/1999	6/7/1999	6/22/1999
		4/27/1998	5/30/1998	6/25/1998
		4/28/1997	5/27/1997	6/23/1997
	Palomarin	5/14/2004	6/15/2004	6/23/2004
		4/30/2003	5/28/2003	6/18/2003
		5/12/2002	5/28/2002	6/15/2002
		5/21/2001	6/18/2001	n/a
		5/11/2000	5/25/2000	6/13/2000
		5/11/1999	6/8/1999	6/30/1999
		5/13/1998	6/9/1998	7/1/1998
		5/5/1997	5/30/1997	6/26/1997
		4/29 and 4/30 1996	5/16/1996	5/30/1996
		5/11/1995 [b]	5/25/1995 [b]	6/29/1995 [b]
		4/22/1994 [b]	6/12/1994 [b]	6/23/1994 [b]
		5/10/1993 [b]	6/26/1993 [b]	6/26/2003 [b]
	Palomarin Grid 5	5/15/2004	6/6/2004	6/18/2004
		4/29/2003	5/28/2003	6/19/2003
		5/12/2002	5/28/2002	n/a
		5/23/2001	6/11/2001	n/a
		5/9/2000	5/22/2000	7/9/2000
		5/20/1999	6/12/1999	7/3/1999
		5/16/1998	6/12/1998	7/3/1998
		5/6/1997	5/31/1997	6/26/1997
		5/4/1996	5/31/1996	6/11/1996

Park	Station	Visit #1	Visit #2	Visit #3
Other	Pine Gulch	5/20/2004	6/8/2004	6/30/2004
		5/4/2003	6/2/2003	6/16/2003
		5/12/2002	5/30/2002	6/13/2002
		5/20/2001	6/28/2001	n/a
		5/18/2000	6/29/2000	7/9/2000
		5/11/1999	6/19/1999	6/30/1999
		5/13/1998	6/5/1998	6/23/1998
		5/31/1997	6/12/1997	6/26/1997

[a] Not presented are dates when surveyed in the 1980's and 1990's. [b] Points were surveyed year-round in these years, including more than 3 times per breeding season; chose the most appropriate dates during the breeding season to include herein.

Appendix C. Examples of online point count data query tools.



Point Count Database Queries

Index | Field Forms and Help | Log out

There are a total of 9326 records in your dataset.

Step 1: Select the stations you'd like to include in your query, using the checkboxes on the left, or just choose a "quick query" from the choices on the right.

State	Region	Station	Records	Visits	Years censused	Datatype(s)	Richness	Quick Queries
CA	MARIN	ARHO	223	3	2004	VCP	32	View Raw Data View Species List
CA	SAN BENIT	BALC	416	3	2004	VCP	41	View Raw Data View Species List
CA	MARIN	ESTE	458	3	2004	VCP	43	View Raw Data View Species List
CA	SAN BENIT	HEAD	328	3	2004	VCP	48	View Raw Data View Species List
CA	SAN BENIT	HIGH	358	3	2004	VCP	45	View Raw Data View Species List
CA	CONTRA CO	JOMU	727	3	2004	VCP	46	View Raw Data View Species List
CA	MARIN	LACR	717	3	2004	VCP	59	View Raw Data View Species List
CA	MARIN	LOOL	408	2	2004	VCP	48	View Raw Data View Species List
CA	SAN BENIT	MCCA	478	3	2004	VCP	44	View Raw Data View Species List
CA	MARIN	MUHO	755	3	2004	VCP	49	View Raw Data View Species List
CA	SAN BENIT	NCPE	277	3	2004	VCP	35	View Raw Data View Species List
CA	SAN BENIT	NFCC	466	3	2004	VCP	47	View Raw Data View Species List
CA	SAN BENIT	NWTR	524	3	2004	VCP	41	View Raw Data View Species List
CA	MARIN	PAG5	303	3	2004	VCP	42	View Raw Data View Species List
CA	MARIN	PALO	488	3	2004	VCP	40	View Raw Data View Species List

Point Count Database Queries Page 2 of 2

☐	CA	MARIN	PIGU	290	3	2004	VCP	29	View Raw Data View Species List
☐	CA	MARIN	RECR	1372	3	2004	VCP	59	View Raw Data View Species List
☐	CA	SAN BENIT	SCPE	277	3	2004	VCP	33	View Raw Data View Species List
☐	CA	SAN BENIT	SWTR	461	3	2004	VCP	55	View Raw Data View Species List

Step 2: Select the data you wish to use from the list below:

All data ☐
Less than 50m ☐
Call < 50 ☐
Vis < 50 ☐
Song < 50 ☐
Call > 50 ☐
Vis > 50 ☐
Song > 50 ☐
Call Fly-over ☐
Vis Fly-Over ☐
Song Fly-Over ☐

Step 3: (optional): Select a date range and year range from the list below.

Month & Day Range:
- to -
and/or
Year Range:
1984 to 1984

Step 4: Select level of query:
- (•) by station (aka transect)
- ( ) by site (aka point)

Step 5 (optional): Select species off this list you'd like to eliminate from consideration:

WIWA
WIWR
OSFL
SOSP
ORJU
PSFL

Step 6: push this little button ----> Submit Query

logged in as SFBAN

Appendix D. Total captures by season and banding location for all species**,** PORE and GOGA 2004. Winter=Nov 2003 through April 2004, spring/summer=May through Aug 15 2004, fall=Aug 16 through Oct 2004.

	LACR		MUHO			PGUP			PIGU			PALO			RECR	
	spr/su	fall	winter	spr/su	fall	winter	spr/su	fall	winter	spr/su	fall	winter	spr/su	fall	spr/su	fall
Sharp-shinned Hawk	0	1	0	0	0	1	0	0	2	0	0	10	6	10	1	2
Cooper's Hawk	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0
Red-shouldered Hawk	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Mourning Dove*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
California Quail*	1	0	1	12	0	0	0	0	0	0	0	3	9	4	16	0
Hairy Woodpecker	0	0	2	1	0	0	0	0	1	0	1	0	3	1	0	0
Downy Woodpecker	3	0	1	1	1	0	0	0	2	7	4	2	7	4	0	0
Red-breasted Sapsucker	0	0	1	0	0	0	0	0	0	0	0	7	0	0	0	0
Red-shafted Flicker	0	0	0	0	2	0	0	0	0	0	0	3	4	3	0	0
Anna's Hummingbird*	1	1	1	4	0	1	0	1	5	7	3	13	17	1	13	1
Rufous Hummingbird*	0	0	0	0	0	0	1	0	0	0	0	0	0	1	2	0
Allen's Hummingbird*	2	0	7	5	0	4	4	0	9	19	0	14	63	0	82	0
Black Phoebe	0	0	0	0	2	0	0	0	2	0	5	1	1	0	3	1
Olive-sided Flycatcher	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0
Western Wood-pewee	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Western Flycatcher	0	2	0	2	5	0	1	4	0	3	2	0	16	22	2	2
Pacific Slope Flycatcher	5	3	0	6	22	0	5	4	0	0	4	2	65	54	5	14
Willow Flycatcher	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Steller's Jay	2	0	0	0	0	0	0	0	0	0	0	0	12	3	0	0
Western Scrub-jay	0	0	0	0	0	0	0	0	0	0	0	3	3	2	2	0
European Starling	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Brown-headed Cowbird	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Purple Finch	2	2	0	1	2	0	2	3	6	1	0	1	34	4	16	4
House Finch	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0
American Goldfinch	1	0	0	2	0	0	2	0	1	11	0	2	13	0	10	6
Lesser Goldfinch	3	1	0	0	1	0	0	0	0	0	0	0	0	0	0	4
Pine Siskin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
White-crowned Sparrow, Unid.	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Puget Sound White-crown Sparrow	0	8	0	0	1	0	0	1	1	0	0	1	0	4	0	3
Gambel's White-crowned Sparrow	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Nuttall's White-crowned Sparrow	0	0	2	0	0	1	0	4	0	0	0	9	6	3	0	3
Golden-crowned Sparrow	0	21	11	0	8	1	0	8	7	0	1	13	0	25	0	3

	LACR		MUHO			PGUP			PIGU			PALO			RECR	
	spr/su	fall	winter	spr/su	fall	winter	spr/su	fall	winter	spr/su	fall	winter	spr/su	fall	spr/su	fall
White-throated Sparrow	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Chipping Sparrow	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Slate-colored Junco	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Oregon Junco	0	1	0	2	1	0	3	0	13	1	0	20	50	25	0	0
Song Sparrow	68	55	52	70	54	10	7	11	49	76	36	41	96	37	66	54
Lincoln's Sparrow	0	3	1	0	2	0	0	0	1	0	2	2	0	4	0	5
Swamp Sparrow	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Fox Sparrow	0	15	20	0	27	20	0	25	26	0	10	24	0	49	0	5
Spotted Towhee	5	10	5	1	0	5	6	10	1	0	0	17	47	23	5	4
California Towhee	0	0	1	0	0	0	0	0	0	0	0	0	2	1	3	0
Black-headed Grosbeak	4	0	0	3	0	0	0	0	0	1	0	0	0	1	4	0
Western Tanager	0	0	0	0	0	0	0	2	0	0	0	1	0	1	0	2
Summer Tanager	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Barn Swallow	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Tree Swallow	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0
Violet-green Swallow	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
Northern Rough-winged Swallow	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Warbling Vireo	6	9	0	3	4	0	0	0	0	5	3	0	14	2	2	67
Hutton's Vireo	0	3	2	2	2	2	2	1	1	1	1	22	10	7	0	2
Nashville Warbler	0	0	0	0	0	0	0	1	0	0	0	0	0	5	0	0
Orange-crowned Warbler	10	0	1	2	0	16	3	0	10	0	1	16	44	2	10	1
Yellow Warbler	1	3	0	0	5	0	0	0	0	0	3	0	0	4	0	1
Myrtle Warbler	0	0	2	0	0	0	0	0	0	0	2	1	0	0	0	1
Yellow-rumped Warbler, Unid.	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
Audubon's Warbler	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Chestnut-sided Warbler	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Black-throated Gray Warbler	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Townsend's Warbler	0	2	1	0	0	0	0	0	2	0	2	24	0	28	0	2
Hermit Warbler	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
MacGillivray's Warbler	0	0	0	2	0	0	1	0	0	0	0	0	4	2	0	5
Common Yellowthroat	0	3	5	16	6	0	0	0	6	1	11	0	0	0	1	4
Yellow-breasted Chat	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Wilson's Warbler	50	17	6	48	6	12	20	0	7	42	7	19	216	3	48	6
Canada Warbler	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0

	LACR		MUHO			PGUP			PIGU			PALO			RECR	
	spr/su	fall	winter	spr/su	fall	winter	spr/su	fall	winter	spr/su	fall	winter	spr/su	fall	spr/su	fall
Bewick's Wren	2	7	21	10	16	14	21	9	2	1	5	8	47	6	3	0
House Wren	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Winter Wren	0	2	15	0	7	0	0	1	2	0	0	7	6	5	0	1
Marsh Wren	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown Creeper	1	0	0	1	0	0	0	0	0	1	0	4	27	7	0	0
Red-breasted Nuthatch	0	0	0	0	0	0	1	0	0	0	0	1	12	7	0	0
Chestnut-backed Chickadee	6	1	5	2	2	7	2	3	16	2	3	53	65	11	15	2
Wrentit	6	0	12	16	6	25	39	49	13	8	3	25	90	17	9	5
Bushtit	12	0	7	1	0	2	0	3	0	2	1	12	24	9	0	8
Golden-crowned Kinglet	0	0	0	0	0	2	0	0	0	0	0	70	16	7	0	0
Ruby-crowned Kinglet	0	1	34	0	16	48	0	17	94	0	6	254	0	79	0	20
Blue-gray Gnatcatcher	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Swainson's Thrush	52	14	0	44	5	0	5	3	0	70	0	1	133	35	65	12
Hermit Thrush	0	10	28	0	14	14	1	17	20	0	4	63	3	59	0	15
American Robin	3	0	16	0	0	1	0	0	7	1	0	32	8	0	0	0
Varied Thrush	0	0	0	0	0	0	0	0	0	0	0	4	0	1	0	0
Western Bluebird	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Net Hours	612	613	1043	531	619	1090	523	513	881	564	500	10366	8994	6959	634	611

*Except hummingbirds at Palo, all of these species are ones that are not given federal bands.

Appendix E. Species detected during fall 2004 on area search plots (mid-August through October).

Species	LACR	MUHO	PALO	PIGU	RECR
Great Blue Heron		●			
California Quail		●	●		●
Band-tailed Pigeon	●		●		
Mourning Dove	●				●
Turkey Vulture	●	●	●	●	
Sharp-shinned Hawk			●	●	●
Cooper's Hawk		●			●
Red-tailed Hawk	●	●	●		●
Red-shouldered Hawk		●	●	●	●
American Kestrel		●			
Belted Kingfisher				●	●
Hairy Woodpecker	●	●	●		
Downy Woodpecker	●	●	●	●	●
Nuttall's Woodpecker	●				
Pileated Woodpecker	●				
Red-shafted Flicker		●	●	●	●
Anna's Hummingbird	●	●	●	●	●
Allen's Hummingbird			●		
Say's Phoebe				●	
Black Phoebe		●	●	●	●
Pacific Slope Flycatcher	●	●	●	●	●
Steller's Jay	●	●	●	●	●
Western Scrub-jay	●	●	●	●	●
Common Raven	●	●	●	●	●
American Crow	●			●	●
European Starling		●		●	
Western Meadowlark			●	●	
Brewer's Blackbird	●	●			
Purple Finch		●	●	●	●
House Finch				●	
American Goldfinch	●	●	●	●	●
Lesser Goldfinch		●			●
Pine Siskin		●	●	●	●
White-crowned Sparrow	●	●	●		●
Nuttall's White-crowned Sparrow			●		●
Golden-crowned Sparrow	●	●	●	●	●
Oregon Junco		●	●	●	●
Song Sparrow	●	●	●	●	●
Lincoln's Sparrow		●		●	●
Swamp Sparrow				●	
Fox Sparrow	●	●	●	●	●
Spotted Towhee	●	●	●	●	●
California Towhee	●	●	●		
Black-headed Grosbeak	●			●	●
Western Tanager		●	●		●
Cliff Swallow			●		
Barn Swallow	●		●	●	●
Tree Swallow			●		

Species	LACR	MUHO	PALO	PIGU	RECR
Cedar Waxwing			●	●	●
Warbling Vireo	●	●		●	●
Cassin's Vireo				●	
Hutton's Vireo	●	●	●	●	●
Nashville Warbler				●	
Orange-crowned Warbler		●	●	●	●
Yellow Warbler	●	●	●	●	●
Myrtle Warbler				●	
Yellow-rumped Warbler			●	●	
Audubon's Warbler				●	
Chestnut-sided Warbler					●
Black-throated Gray Warbler			●	●	
Townsend's Warbler	●	●	●	●	●
Western Palm Warbler				●	
MacGillivray's Warbler		●			●
Common Yellowthroat	●	●		●	●
Wilson's Warbler	●	●	●	●	●
Bewick's Wren	●	●	●	●	●
Winter Wren	●	●	●	●	●
Marsh Wren				●	
Brown Creeper	●	●	●		●
Red-breasted Nuthatch	●		●		●
Pygmy Nuthatch	●				
Chestnut-backed Chickadee	●	●	●	●	●
Wrentit	●	●	●	●	●
Bushtit	●	●	●	●	●
Golden-crowned Kinglet	●		●		●
Ruby-crowned Kinglet	●	●	●	●	●
Blue-gray Gnatcatcher		●	●	●	
Swainson's Thrush	●	●	●		●
Hermit Thrush		●	●	●	●
American Robin		●		●	
Varied Thrush			●		

Appendix F. Winter Bird Population Studies Summaries, Palomarin, PORE, 2004.

Disturbed Coastal Scrub B (Grid 1) 2004, by Amon Armstrong.

Location: California; Marin Co.; Bolinas; Palomarin Field Station; 37°55'N, 122°45'W; Bolinas Quadrangle, USGS. **Continuity:** Established 1980; 14 yrs. continuous Size: 8.1 ha**. Description of Plot:** See American Birds 25: 1002-1003 (1971); but part of plot is succeeding to Douglas Fir forest. **Weather:** Mean start temperature 7.5°C (range 2-11°C). Total rain precipitation for the study period (01/05/2004 - 02/23/2004) was 49.7 cm. **Coverage:** 38.25 hrs; 8 visits (mornings): 5, 18, 22, 28 Jan.; 4,12, 19, 23 Feb. **Count:** White-tailed Kite, 0.75/visit, (6 visits); Northern Harrier, 0.13, (1); Red Shouldered Hawk, 0.13, (1); Anna's Hummingbird, 2.75 (8); Red-shafted Flicker, 3.25 (8); Black Phoebe, 0.25, (1); Western Scrub Jay, 1.25 (6); Common Raven, 0.5, (2); Chestnut-backed Chickadee, 6.63, (8); Bushtit, 9.38 (3); Bewick's Wren, 5.63, (8); Winter Wren, 5.25 (8); Golden-crowned Kinglet, 2.0, (6); Ruby-crowned Kinglet, 17.38, (8); American Robin, 12.13, (8); Wrentit, 9.63, (8); Spotted Towhee, 3.38, (8); California Towhee, 1.5, (6); Fox Sparrow, 4.0, (8); Song Sparrow, 6.5 (8); Golden-crowned Sparrow, 2.75, (8); White-crowned Sparrow, 0.38 (1); **Total:** 22 species; 94.5 ind./visit (466.7 ind./40 ha).
Remarks: The species richness of 22 was the lowest in fourteen consecutive years of winter bird census study on grid 1, but not too far from the average of 27.31 for the period 1991-2003. The species richness of last year, 2003, was one of the highest at 32. The only other year to break 30 was 1992, with 33. The mean number of individuals per visit (94.50) was higher than the 1991-2003 mean (91.86), but lower than that of 2003 (126.88). Species reported during the previous year on this plot that were not reported this year are: Allen's Hummingbird, Say's Phoebe, Steller's Jay, Brown Creeper, Varied Thrush, Yellow-rumped Warbler, Oregon Junco, Purple Finch, Pine Siskin and American Goldfinch; all of these have been absent in at least one other year as well. Other exclusions that were seen very near the plot were: California Quail, Downy Woodpecker, Hutton's Vireo, and Hermit Thrush. Species reported this year that were not reported in 2003 are: White-tailed Kite, Northern Harrier, Red-Shouldered Hawk, and Common Raven. These species were seen perched on the plot. Common Raven were reported only as "fly-overs" in 2003. 1 Red-tailed Hawk and an average of 2.4 Turkey Vultures per day were also observed searching the plot, but were not included in the data. Excluding species not reported, decreases this year compared to the 1991-2003 mean includes: Black Phoebe (-35.66%), Western Scrub-Jay (-55.67%), Bushtit (-47.55%), Bewick's Wren (-21.24%), Golden-crowned Kinglet (-36.96%), Wrentit (-30.12%), Spotted Towhee (-34.49%), Song Sparrow (-54.0%), and White-crowned Sparrow (-90.99%). Increases include: White-tailed Kite (+900%); Northern Harrier (+247.22%); Red-shouldered Hawk (+337.50%); Red-tailed Hawk (+71.89%); Red-shafted Flicker (+29.70%); Common Raven (+266.28%); Chestnut-backed Chickadee (+69.52%); Ruby-crowned Kinglet (+32.27%); and American Robin (+126.22%).

Further details for the 2004 data are summarized in raw data tables.

Disturbed Coastal Scrub A (Grid 2) 2004, by Elvis Cuevas Mendoza.

Location: California; Marin Co.; Bolinas; Palomarin Field Station; 37°55'N, 122°45'W; Bolinas Quadrangle, USGS. **Continuity:** Established 1980; 14 yr. Size: 4.7 ha**.**
Description of Plot: See American Birds 26: 987-988 (1972).
Weather: Mean start temperature 8.6°C (range 2-12°C). Total rain precipitation for the study period (01/05/2004 - 02/13/2004) was 13.24 cm. **Coverage:** 21.42 hrs; 8 visits (mornings): 5, 16, 20, 26 Jan.; 4, 6, 9, 13 Feb. **Count:** California Quail, 2.5 ind./visit (3 visits); Anna's Hummingbird, 4.75 (8); Common Raven, 0.13 (1); Sharp-shinned Hawk, 0.13 (1); Downy Woodpecker, 0.75 (5); Red-shafted Flicker, 3.75 (7); Hutton's Vireo, 1.00 (5); Steller's Jay, 1.38 (7); Western Scrub Jay, 2.88 (8); Chestnut-backed Chickadee, 9.00 (8); Bushtit, 2.88 (3); Red-breasted Nuthatch, 1.25 (6); Bewick's Wren, 3.50 (8); Winter Wren, 1.50 (8); Ruby-crowned Kinglet, 12.50 (8); Hermit Thrush, 1.13 (6); American Robin, 16.88 (8); Varied Thrush, 0.38 (2); Wrentit, 6.25 (8); Spotted Towhee, 2.75 (8); California Towhee, 0.75 (3); Fox Sparrow, 3.75 (8); Song Sparrow, 3.5 (7); White-crowned Sparrow, 0.13 (1); Nuttall's White-crowned Sparrow, 0.13 (1); Golden-crowned Sparrow, 2.0 (4). **Total:** 26 species; 85.50 ind/visit (728 ind./40 ha).
Remarks: The species richness of 26 in the fourteenth consecutive year of winter bird census study on grid 2 was lower than the previous 2 years (36), highest richness of all years, and the mean (31) collected from 1991-2003 data. The total number of individuals (728) recorded during the eight visits was higher than the 1991-2003 mean (700.23) and lower than that of 2003 (762). Themean number of individuals per visit (85.50) was lower than both the 1991-2003 mean (89.47) and that of 2003 (95.25).
Species reported during the previous year on this plot that were not reported this year are: Pine Siskin, American Goldfinch, Purple Finch, Red Crossbill, Oregon Junco, Yellow-rumped Warbler, Golden-crowned Kinglet, Pygmy Nuthatch, Brown Creeper, Black Phoebe, Hairy Woodpecker and Allen's Hummingbird. Two special cases were the Golden-crowned Kinglet and Oregon Junco having means of 4.08 and 1.70 ind./visit respectively during the 1991-2003 period. Decreases this year compared to the 91-2003 mean includes California Quail (-56.82%), Bushtit (-64.24%), Bewick's Wren (-21.22%), Hermit Thrush (-42.63%), Varied Thrush (-14.46%), Wrentit (-24.33%), Spotted Towhee (-39.05%), California Towhee (-26.44%), Song Sparrow (-56.48%), and Golden-crowned Sparrow (-44.15%). Increases include: Sharp shinned Hawk (+745%: not reported in the previous 9 years); Anna's Hummingbird, (+104.13%); Red-shafted Flicker (+94.61%); Hutton's Vireo (+63.01%); Steller's Jay (+38.75%); Western Scrub Jay (+23.54%); Common Raven (+82.70%); Chestnut-backed Chickadee (+103.64%); Red-breasted Nuthatch (+490.91%); Winter Wren (+181.59%); Ruby-crowned Kinglet (+63.56%); American Robin (+122.77%) and Fox Sparrow (+99.56%).

Further details for the 2004 data are summarized in raw data tables.

Undisturbed Coastal Scrub: Stewart Plot (Grid 4) 2004, by Parvaneh Abbaspour.

Location: California; Marin Co.; Bolinas; Palomarin Field Station; 37°55'N, 122°45'W; Bolinas Quadrangle, USGS. **Continuity:** Established 1971; 18 yr. **Size**: 8.1 ha**.**
Description of Plot: See *Am. Birds* 25: 1003-1004 (1971).
Weather: Mean start temperature 6.25°C (range 2-10°C). Total rain precipitation for the study period (01/05/2004 - 02/27/2004) was 24.3 cm.
Coverage: 50.5 hrs; 8 visits (mornings): 5, 16, 23, 28 Jan.; 4, 8, 21, 27 Feb.
Count: Wrentit, 25.8 ind./visit (8 visits); Ruby-crowned Kinglet, 24.6 (8); Chestnut-backed Chickadee, 18.4 (8); Golden-crowned Kinglet, 16.8 (8); Bewick's Wren, 11.9 (8); Spotted Towhee, 8.8 (8); American Robin, 8.3 (8); Anna's Hummingbird, 7.0 (8); Hermit Thrush, 5.6 (8); Fox Sparrow, 5.6 (8); Bushtit, 5.4 (4); Northern Flicker, 4.9 (8); Song Sparrow, 4.3 (8); Allen's Hummingbird, 3.6 (6); Western Scrub-Jay, 3.3 (8); Steller's Jay, 2.8 (6); White-crowned Sparrow, 2.4 (6); Hutton's Vireo, 2.3 (6); Yellow-rumped Warbler, 2.1 (4); Red-breasted Nuthatch, 0.9 (5); Oregon Junco, 0.5 (3); Common Raven, 0.5 (4); Black Phoebe, 0.4 (2); American Kestrel, 0.3 (2); Brown Creeper, 0.3 (2); Townsend's Warbler, 0.3 (1); Orange-crowned Warbler, 0.3 (1); Cooper's Hawk, 0.1 (1); Sharp-shinned Hawk, 0.1 (1); Hairy Woodpecker, 0.1 (1); Say's Phoebe, 0.1 (1); Varied Thrush, 0.1 (1); Winter Wren, 0.1 (1); Downy Woodpecker, 0.1 (1); Mourning Dove, 0.1 (1); California Towhee, 0.1 (1).
Total: 36 species; 167.9 ind./visit (829 ind./40 ha).
Remarks: Species richness was the highest ever recorded on this mature coastal scrub plot. Say's Phoebe was detected on the plot for the first time. Cooper's Hawk, American Kestrel and Downy Woodpecker were noted for the first time in 10 or more years. Numbers of many species regularly present (6 or more consecutive visits) were much higher than in past years, specifically: Wrentit (+90%), Bewick's Wren (+95%), Anna's Hummingbird (+300%), Allen's Hummingbird (+232%), Northern Flicker (+191%), Hermit Thrush (+195%), Chestnut-backed Chickadee (+296%), Ruby-crowned Kinglet (+114%), and Golden-crowned Kinglet (+144%). This may reflect that the total survey time this year was more than twice (+151%) the mean survey time (20.1hrs) of previous years, and the observer was on hand to detect more individuals throughout the census. As well, the 2004 observer surveyed this plot previously, and their increased familiarity with this difficult to traverse plot may also account for observational differences. However, the breeding density for Wrentits was at an all time high for the 2003 breeding season and may also attribute to their increased presence on the plot. Fox Sparrow showed a marked increase compared to the mean of previous years (+124%), but their numbers decreased (-62%) relative to 2003. Also down from last year, and in general, was Winter Wren (-98% and -91%, respectively) and Oregon Junco (-97% and -74%). Pine Siskin and Purple Finch, both present in most years, were not detected this year. For the third consecutive year, two forest species, Hutton's Vireo and Steller's Jay, demonstrated a regular presence on the grid.

Historically Grazed Coastal Scrub A (Grid 5 East) 2004, by Michael Rogner

Location: California; Marin Co.; Bolinas; Palomarin Field Station; 37°55'N, 122°45'W; Bolinas Quadrangle, USGS. **Continuity:** Established 1997; 8 yrs. continuous. The plot was grazed through 2002. **Weather:** Mean start temperature 7.5°C (range 2-11°C). Total rain precipitation for the study period (01/05/2004 - 02/23/2004) was 49.7 cm. **Coverage:** 28.55 hrs; 8 visits (mornings): 1, 16, 23, 29 Jan.; 4,11, 19, 27 Feb. **Count:** Turkey Vulture, 0.63 individuals/visit; White-tailed Kite, 0.13; Northern Harrier, 0.13; Peregrine Falcon, 0.13; American Kestrel, 0.75; Burrowing Owl, 0.13; Anna's Humingbird, 0.38; Allen's Hummingbird, 0.25; Northern Flicker, 0.13; Black Phoebe, 0.5; Say's Phoebe, 0.38; Bewick's Wren, 1.0; Marsh Wren, 0.25; Ruby-crowned Kinglet, 0.5; Western Bluebird, 0.38; American Robin, 0.13; Wrentit, 0.25; Spotted Towhee, 0.5; Rufous-crowned Sparrow, 0.13; Savannah Sparrow, 3.88; Lincoln's Sparrow, 0.25; Song Sparrow, 11.5; White-crowned Sparrow, 1.88; Western Meadowlark, 0.75. **Total:** 24 species; 24.9 ind./visit (199 ind/8 ha). **Remarks:** The species richness of 24 matched the highest year on record (1999), and was significantly higher than the average from 1997-2003 (15.9). The mean number of birds detected per survey was 24.9, lower than the historical average of 32.7. Several new birds were seen in 2004. These include: White-tailed Kite, Northern Harrier, Burrowing Owl, Black Phoebe, Rufous-crowned Sparrow, and Lincoln Sparrow. One Peregrine Falcon was seen for the 2nd year in a row. Notably absent was Golden Crowned Sparrow which had been detected in 5 of 7 years, and Western Scrub-Jay and Audubon's Warbler, both of which had been detected in 4 of 7 years. Birds that saw significant increases over the historical mean include Anna's Hummingbird (+380%), Say's Phoebe (+272%), Marsh Wren (+313%), Spotted Towhee (+500%), and Song Sparrow (+287%). Species seeing declines included Western Bluebird (-268%), American Robin (-1,494%), White-crowned Sparrow (-163%), and Western Meadowlark (-393%).

Historically Grazed Coastal Scrub B (Grid 5 West) 2004, Michael Rogner

Location: California; Marin Co.; Bolinas; Palomarin Field Station; 37°55'N, 122°45'W; Bolinas Quadrangle, USGS. **Continuity:** Established 1997; 8 yrs. continuous. The plot was grazed through 2002. **Weather:** Mean start temperature 7.5°C (range 2-11°C). Total rain precipitation for the study period (01/05/2004 - 02/23/2004) was 49.7 cm. **Coverage:** 28.55 hrs; 8 visits (mornings): 1, 16, 23, 29 Jan.; 4,11, 19, 27 Feb. **Count:** Turkey Vulture, 0.13 individuals/visit; White-tailed Kite, 0.25; Cooper's Hawk, 0.13; Peregrine Falcon, 0.13; California Quail, 6.88; Common Poorwill, 0.13; Anna's Hummingbird, 1.63; Allen's Hummingbird, 1.13; Northern Flicker, 1.38; Black Phoebe, 1; Hutton's Vireo, 1.38; Steller's Jay, 0.38; Western Scrub-Jay, 3.13; Chestnut-backed Chickadee, 3.25; Bushtit, 7.75; Red-breasted Nuthatch, 0.13; Bewick's Wren, 3.63; Winter Wren, 1; Marsh Wren, 1.63; Golden-crowned Kinglet, 0.25; Ruby-crowned Kinglet, 6.13; Western Bluebird, 0.75; Hermit Thrush, 0.5; American Robin, 0.5; Varied Thrush, 0.13; Wrentit, 2.25; Orange-crowned Warbler, 0.13; Yellow-rumped Warbler, 1; Spotted Towhee, 3.88; California Towhee, 0.13; Savannah Sparrow, 0.38; Fox Sparrow, 1.5; Song Sparrow, 12.75; White-crowned Sparrow, 10; Golden-crowned Sparrow, 0.63. **Total:** 36 species; 80.4 ind./visit (643 ind/8 ha). **Remarks:** The species richness of 36 was the second highest on record, and was significantly higher than the average from 1997-2003 (29.7). The mean number of birds detected per survey was 75.9, comparable to the historical average of 71.3. A Peregrine Falcon was seen for the first time on the plot. Notably absent were Oregon Junco and Purple Finch which had been detected in 6 of 7 years, Pine Siskin, which had occurred on 5 previous counts, and Audubon's Warbler, which had been detected in 4 of 7 years. Birds that saw significant increases over the historical mean include Anna's Hummingbird (+108%), Allen's Hummingbird (+190%), Black Phoebe (+113%), Hutton's Vireo (+214%), Marsh Wren (+1,142%), Spotted Towhee (+165%), Savannah Sparrow (+475%), and Song Sparrow (+130%). Species seeing declines included Golden-crowned Kinglet (-128%), American Robin (-460%), California Towhee (-215%), and Golden-crowned Sparrow (-225%).

CD Supplement A

See the enclosed CD for GPS coordinates and available narratives of all point count stations.